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What Remains to be Discovered by John Maddox

Review by Arnold Benz

Is the universe governed by a Theory of Everything that will soon be discovered, or will physics be replaced by a New Physics in a never ending succession? John Maddox is not a philosopher treating this question from first principles. Scientists in the past three decades have not come around this person, who was editor-in-chief of "Nature" the most prestigious scientific journal in the world. In this function he has seen hundreds of articles submitted every month. Such articles contain the most exciting news of researchers "eagerly enthused about the significance and possible outcome of their work"(p.xi). Maddox describes this experience as the "river of discovery"(p.1), a theme that recurs throughout the book. Active scientists may have a different perspective though and rather use the metaphor of an erratic and straining walk through a thick jungle. For the outside reader and spectator from a historic point of view, however, the river image gives a good impression of the breathtaking progress of science in the past five hundred years.

The perspective of Maddox is the broad historic view that active scientists usually do not perceive. The methodology of science progressing in cycles of observations leading to new theories initiating new observations makes its own history seem irrelevant (p.1). The book starts out recounting the discoveries of previous centuries wondering what seemed to remain to be discovered in say 1900. Getting the reader back in time, Maddox makes the point that the River of Discovery is more than the heraclitian progress of a linear time. The history of science of the past century comprises yet another astonishing change of human outlook to reality similar to the revolutions of the preceding centuries. To be discovered by physics in the starting century are the bridge between gravitation and quantum mechanics, the nature of time, an observable string theory and breakthroughs in multi-universes.

The middle and bulk part of the book contains sections on the progress in the fields of physics, biology, computer science, mathematics and technology. Maddox writes a very readable text on the focal points of science in the twentieth century. Although he usually does not define concepts in great detail, the content is correct and includes many exciting topics. The part on biology is enjoyable and instructive for a layman like myself. It is interesting to see how the River of Discovery is evidenced: In the four or five years since the book was written, this river has continued to flow, so that the time of the Big Bang is no longer believed to be somewhere between 10 and 20 billion years, but rather in an interval of 13 to 15 billion years, and there is a majority view that the universe will not collapse in the far future, but its expansion is rather accelerating.

John Maddox answers the introductory question by the prediction that physics will develop beyond today's standard models. Therefore the present view of the world will be replaced by a deeper understanding and more fundamental equations. Thus a Theory of Everything as some enthusiasts have chosen to name the unification of quantum theory and gravity will not be the final answer, but new enigmas will appear and more fundamental questions be asked.

One may have different view why science will not come to an end even with today's physics. The simple equations that are at the basis of today's worldview do not exclude practically infinite complexity. An example may be the human consciousness. It appears to be orders of magnitude

more complex than neurology can grasp, which is orders of magnitude apart from the biochemistry that seems to be its base, which is far too complex to be studied by the basic physical equations of quantum mechanics. Some of this is expressed in the biological parts of the book, where complexity of cell biology and genetics remains to be approached in the future by new developments in computer science. In other words the map of knowledge has not white spots, but is mostly white with some dark spots of knowledge scattered on it.

Is there anything to be discovered outside of science? This is clearly not the question here. Although the view is on the "secrets of the universe, the origin of life and the future of the human race", other human research activities such as in the arts, religion and philosophy are not addressed explicitly. Nevertheless, the book reflects science, and thus transgresses it. Other dimensions of the human existence are alluded in remarks like that there is more to life than genomes (p.234). The book is an example of "scientific culture" in the sense of C.P. Snow's description with no direct reference to the culture reflected in the humanities.

Thus it is an interdisciplinary book! The River of Discovery carries also other substances than water. It is a strong metaphor, and in religious terms that Maddox may ignore, it is a mythological element. And so is the Theory of Everything: Among scientists just a frivolous label of a much sought after breakthrough, it has become a paradigm of a mechanistic, clockwork universe for popular science writers. Obviously, the trans-scientific character of the book would have to be reflected in terms of well defined philosophical and theological concepts to be truly interdisciplinary.

The statements on the future of science are backed by historic developments. It is clear also to Maddox that this does not constitute prove. An evaluation of the signs of the times by the author comes in and is an interesting case of hermeneutics. It is noteworthy how firmly he assures the readers for instance that the universe is not a once-and-for-all event, but happens time and again (p.122). The origin of this belief is not clear, and can express only experiences and hopes that are not scientifically grounded. It is also interesting to notice how the author moves from his well documented historic view to prophetic conclusions that in addition must contain elements that are not based on science.

The lack of a serious interdisciplinary discussion becomes most obvious in undeliberate theological statements. Phrases like "the universe of Genesis, or Guth's equivalent..." (p.122) put science and religion into the same category. Similarly, the reader is surprised to learn that "many hold that the appearance of living things was an act of divine creation. For them, the first appearance of life-forms is not so much a problem"(p.125), suggesting that "spontaneous" appearance of life and "creation" is a contradiction. Obviously, Maddox is not aware of the many theologians that have welcomed and seriously reflected the notion of divine creation in view of Darwinian evolution since the 19th century. He seems to ignore the immense scholarly work on the theological content of Genesis, but rather propagates the Enlightenment interpretation of creation stories being pre-scientific explanations of the natural world. The interdisciplinary spillovers, although minor points in the book, are not on the same level of information. They make clear that the "scientific culture" is not a parallel universe, but lacks serious interdisciplinarity.

On the other hand, the philosophical and theological communities have to ask themselves why their more recent endeavors are less known than the old simplistic answers that too often still persist as stereotypes. A real interdisciplinary dialogue would have to consider scientific, philosophical and theological issues equally seriously. Such a dialogue starts with the recognition that science and

religion originate from different experiences and span different planes of methods and languages. Nevertheless, I recommend this book as a lucid overview on the science part for a lay audience.